$\boxed{\text{HOMEWORK 10}}$

1. Agop's flask height = s · Mehmet's flask height

$$30\text{cm} = s \cdot 40\text{cm}$$
$$\div 40\text{cm}$$
$$s = 0.75$$

Agop's flask volume $= s^3 \cdot 1 \text{ liter} = 0.75^3 \cdot 1 = \boxed{0.422 \text{ Liters}}$

2. Agop's height = s · Mehmet's height

$$5 \text{ ft} = s \cdot 6 \text{ft}$$
$$\div 6\text{ft}$$
$$\frac{5}{6} = s$$

Agop's coat material $= s^2 \cdot$ Mehmet's coat material

$$= \left(\frac{5}{6}\right)^2 \cdot 16 \text{ ft}^2$$
$$= 11.11 \text{ft}^2$$

3. a. $18 \text{ in} = s \cdot 16 \text{ in}$

$$\frac{18}{16} = s = \frac{9}{8} \quad (\star)$$

18" crash weight $= s^3 \cdot$ 16" crash weight

$$= \left(\frac{9}{8}\right)^3 \cdot 2.1 \text{ lbs}$$
$$= \boxed{2.99 \text{ lbs}}$$

b. 18" box material $= s^2 \cdot$ 16" box material

$$= \left(\frac{9}{8}\right)^2 \cdot 5.5 \text{ ft}^2$$
$$= \boxed{6.96 \text{ft}^2}$$

we can ~~use~~ use the same s as above at $(\star)$.

c. Now we need a different s.

New weight $= s^3 \cdot$ 16" crash weight

$$1.8 \text{ lbs} = s^3 \cdot 2.1 \text{ lbs}$$
$$\frac{1.8}{2.1} = s^3$$
$$\left(\frac{1.8}{2.1}\right)^{1/3} = s$$
$$s = 0.9499$$

New width = s · old width

$$= 0.9499 \cdot 16 \text{ in}$$
$$= \boxed{15.20 \text{ in}}$$

4. a. Do this in 3 parts.

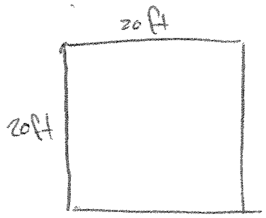
Half the area of a circle!

$\pi r^2 = \pi \cdot (10ft)^2 = 314 ft^2$

$\frac{1}{2}(314) = 157 ft^2$.

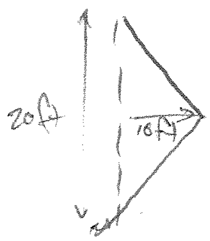
TOTAL: $157 ft^2 + 400 ft^2 + 100 ft^2$

$= \boxed{657 ft^2}$



Area $= l \cdot w = 20ft \cdot 20ft$

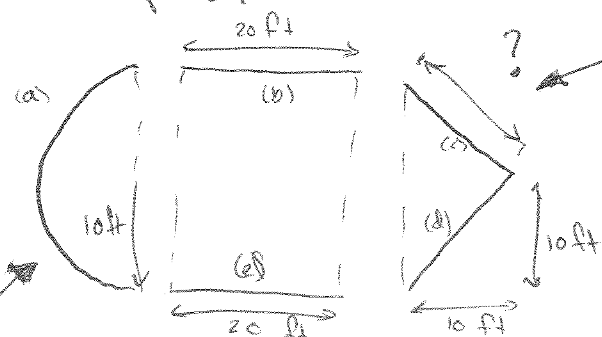
$= 400 ft^2$



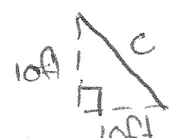
Area $= \frac{1}{2} b \cdot h$

$= \frac{1}{2} \cdot 20ft \cdot 10ft = 100 ft^2$

b. Again, several parts.



Need to use the pythagorean thm on this triangle:



$a^2 + b^2 = c^2$

$10^2 + 10^2 = c^2$

$100 + 100 = c^2$

$200 = c^2$

$14.1 = c$

$\frac{1}{2}$ the circumference of a circle:

$\frac{1}{2} \cdot 2\pi r = \frac{1}{2} \cdot 2\pi (10ft)$

$= 31.4 ft$

So $\underset{(a)}{31.4ft} + \underset{(b)}{20ft} + \underset{(c)}{14.1ft} + \underset{(d)}{14.1ft} + \underset{(e)}{20ft}$

$= \boxed{99.70ft}$

5. a. Sphere: 1 m in radius

$1 \text{ meter} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \cdot \frac{1 \text{ in}}{2.54 \text{ cm}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = 3.28 \text{ ft}$

So volume is: $\frac{4}{3} \cdot \pi r^3 = \frac{4}{3} \cdot \pi (3.28)^3 = \boxed{147.93 \text{ ft}^3}$.

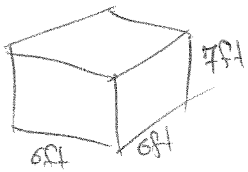
Cylinder: 1.5 meters high:

$1.5 \text{ m} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \cdot \frac{1 \text{ in}}{2.54 \text{ in}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = 4.92 \text{ ft high}$

& radius 3.28 ft

So volume is $\pi r^2 \cdot h = \pi \cdot (3.28)^2 \cdot 4.92 = \boxed{166.42 \text{ ft}^3}$

Box:



Volume $= l \cdot w \cdot h = 6 \cdot 6 \cdot 7 = \boxed{252 \text{ ft}^3}$

So the $\boxed{\text{Box}}$ has the greatest capacity.

b. Sphere: Area $= 4\pi r^2 = 4 \cdot \pi \cdot (3.28)^2 = 135.26 \text{ ft}^2$

$\frac{\$20}{1 \text{ ft}^2} \cdot 135.26 \text{ ft}^2 = \boxed{\$2705.27}$

Cylinder: Area $= 2 \cdot \pi r^2 + 2\pi r h = 2 \cdot \pi \cdot (3.28)^2 + 2 \cdot \pi \cdot (3.28)(4.92) = 169.08 \text{ ft}^2$

$\frac{\$20}{1 \text{ ft}^2} \cdot 169.08 \text{ ft}^2 = \boxed{\$3381.58}$

Box: Area $= 2 \cdot lh + 2 \cdot l \cdot w + 2 \cdot w \cdot h = 2 \cdot 6 \cdot 7 + 2 \cdot 6 \cdot 6 + 2 \cdot 6 \cdot 7 = 240 \text{ ft}^2$

$\frac{\$20}{1 \text{ ft}^2} \cdot 240 \text{ ft}^2 = \boxed{\$4800}$

c. Sphere: $\frac{\$2705.27}{147.93 \text{ ft}^3} = \$18.29/\text{ft}^3$

Cylinder: $\frac{\$3381.58}{166.42 \text{ ft}^3} = \$20.32/\text{ft}^3$

Box: $\frac{\$4800}{252 \text{ ft}^3} = \$19.05/\text{ft}^3$

So the $\boxed{\text{SPHERE}}$ is the best deal.